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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,573	03/11/2004	Charles E. Taylor	SHPR-01360USP	6486
29190 7590 08/07/2007 BELL, BOYD & LLOYD LLP P.O. BOX 1135 CHICAGO, IL 60690			EXAMINER OLSEN, LIN B	
			ART UNIT 3609	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/799,573	Applicant(s) TAYLOR ET AL.	
	Examiner Lin B. Olsen	Art Unit 3609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>See Continuation Sheet</u> . | 6) <input type="checkbox"/> Other: _____ |

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :
6/17/2004,3/25/2005.

DETAILED ACTION

Priority

Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged.

Specification

The disclosure is objected to because of the following informalities:

On page 3, line 3, the Examiner believes the phrase "control the operation of" should be "move".

On Page 4, 2nd paragraph, the last sentence is repeated.

Appropriate correction is required.

Claim Objections

Claim 24 is objected to because of the following informalities: In line 5 of the claim, there is no antecedent basis for "the infrared sensor" and in line 6; there is no antecedent basis for "the robot".

Appropriate correction is required.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims

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are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 15 and 24 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 3 of U.S. Patent No. 6,604,022. Although the conflicting claims are not identical, they are not patentably distinct from each other because the elements of the presented claims include the elements of the patented invention. In particular, the patented invention incorporates a motion unit, a

sensor producing multiple indications of a closest object, and a processor that enables the unit to avoid the feature.

Serial No. 10/799,573	Patent No. 6,604,022
<p>15. A robot comprising: a motion unit; a sensor producing multiple indications of distances to the closest object in an associated portion of the environment; and a processor to receive the indications from the sensor, determine a feature in the environment and control the motion unit to avoid the feature.</p>	<p>1. A robot to operate autonomously, comprising: a driving subsystem to autonomously move the robot; an emitter/detector subsystem to detect an object in close proximity to the robot based on a signal reflection; a temperature sensitive subsystem to detect an object in close proximity to the robot based on a change in temperature; and an edge detection subsystem to detect an edge in close proximity to the robot; wherein the driving subsystem will change a direction of the robot, in response to an object or an edge in close proximity to the robot being detected, to thereby prevent the robot from colliding with an object or falling off an edge.</p>
<p>24. A method comprising: producing pulses of light; using the light to produce indications of the distances to the closest objects in an portions of the environment; and using the indications from the infrared sensor to determine a feature in the environment so that the robot can be controlled to avoid the feature.</p>	<p>3. The robot according to claim 1, wherein the object detection subsystem comprises: at least one active infrared emitter to emit infrared signals; and a signal receiving device to detect infrared signal reflections.</p>

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless – A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 15-16, 18, 20-22, 24-26, 28, 30-32 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,338,013 to Ruffner (hereafter referred to as Ruffner). Ruffner discloses a multifunctional mobile appliance.

Regarding **claim 15**, the reference describes a multifunctional mobile appliance capable of performing a variety of tasks out of sight of an owner, which is the current term for a robot. “a motion unit” reads on a mobile unit (1) in Fig.1 and as discussed at Col. 4, line 67. “a sensor producing multiple indications of distances to the closest object in an associated portion of the environment” reads on the first obstacle avoidance mechanism described in Col. 12, lines 2-27. The mechanism detects obstacles and their location. At line 18, Ruffner discusses bouncing pulses off of objects – which indicates there would be multiple readings from an object. “a processor to receive the indications from the sensor, determine a feature in the environment and control the motion unit to avoid the feature.” reads on the controller/processor (66) as illustrated in Fig 8, which

receives data from the obstacle detection (70). At Col. 12, line 8, Ruffner describes mapping the amplitude and delay of the reflections to obtain a snap shot of objects in the environment.

Regarding **claim 16**, which depends on claim 15, "the indications are produced by measuring a period of time to receive a reflected pulse," reads on Col 12, line 8 – mapping the delay of any reflections.

Regarding **claim 18**, which depends on claim 15, "the feature is indicated in an internal map," reads on Col. 36, lines 35-41 where obstacles are mapped in the routing grid.

Regarding **claim 20**, which depends on claim 15, "wherein the feature is an object in a room" reads on Ruffner where the obstacle detection as described in Col. 12, lines 2-27 works in the context of performing tasks, such as floor vacuuming, waxing, and polishing, or rug shampooing a room (Abstract).

Regarding **claim 21**, which depends on claim 15, "wherein the robot is a robot cleaner" – reads on Ruffner's machine performing cleaning tasks as detailed in the abstract.

Regarding **claim 22**, which depends on claim 15, "wherein the sensor is an infrared sensor" read on Ruffner, although Ruffner describes using ultrasonic transducers in Col. 12, lines 2-14 and many other areas. However, in lines 15-18 Ruffner indicates that the ultrasonic transducers can be replaced by radar or lidar (light detecting and ranging) means. Further, in Col 36 lines 32-38, Ruffner refers to the ultrasonic, radar and lidar pulses as being sent out by the system. Therefore, Ruffner

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teaches using infrared sensors as in the background of the invention (Col. 3, lines 60–61) in the invention.

Regarding **claim 24**, an independent method claim, “producing pulses of light,” reads on a variation of Ruffner. In Col. 12, line 6-8, it describes transmitting sonic pulses. But in lines 15-18 it indicates that the ultrasonic transducers can be replaced by radar or lidar (light detecting and ranging) means. “using the light to produce indications of the distances to the closest objects in an portions of the environment,” reads on the first obstacle avoidance mechanism described in Col. 12, lines 2-27. At line 18, Ruffner discusses bouncing pulses off of objects – which indicates there would be multiple readings from an object. “using the indications from the infrared sensor to determine a feature in the environment so that the robot can be controlled to avoid the feature.” Reads on the function of the obstacle- avoidance mechanism as described in col. 12, lines 2-27.

Regarding **claim 25**, which depends on claim 24 and is the method version of claim 22, it is rejected for the same reason as claim 22.

Regarding **claim 26**, which depends on claim 24 and is the method version of claim 16, it is rejected for the same reason as claim 16.

Regarding **claim 28**, which depends on claim 24 and is the method version of claim 18, it is rejected for the same reason as claim 18

Regarding **claim 30**, which depends on claim 24 and is the method version of claim 20, it is rejected for the same reason as claim 20.

Regarding **claim 31**, which depends on claim 24 and is the method version of claim 21, it is rejected for the same reason as claim 21.

Regarding **claim 32**, which depends on claim 24 and is the method version of claim 22, it is rejected for the same reason as claim 22. The Examiner notes that claim 24 has been objected to, and when claim 24 is corrected, claim 32 will properly limit claim 24.

Claims 15, 19, 24 and 29 rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,594,844 to Jones (hereafter referred to as Jones). Jones discloses a robot obstacle detection system incorporated in an autonomous vacuum cleaner.

Regarding **claim 15**, the reference is concerned with a robotic vacuum cleaner. "a motion unit" reads on a drive subsystem (304) Col. 8, lines 43-48 and as shown in Fig. 22. "a sensor producing multiple indications of distances to the closest object in an associated portion of the environment" reads on the cliff detection process shown in Fig. 17 and described in Col. 7, lines 53-61 and the wall sensing mechanism shown in Fig. 18 and described in Col. 7 line 62 to Col. 8 line 4. In cliff detect mode, the robot confirms the absence of a surface under the emitter when the detector no longer receives reflections. Similarly, in wall detect mode, a sideways facing emitter identifies a wall when the reflections received indicate a reflective source in close proximity. "a processor to receive the indications from the sensor, determine a feature in the environment and control the motion unit to avoid the feature." Reads on Fig. 22 where

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the microprocessor is disposed between the sensor subsystem and the drive subsystem. In Col 7, lines 43-56 it is explained that the microprocessor implements the logic illustrated in Figs. 17 and 18.

Regarding **claim 19**, which is dependent on claim 15, "wherein the feature is a step," reads on Fig 17, and Col 7, lines 53-61 for the cliff sensor embodiment. The examiner interprets the step to be a down step, a void, based on the use in the specification, where step is used in place of edge, as in edge of a stair.

Regarding **claim 24**, which is the method version of claim 22, it is rejected for the reasons above.

Regarding **claim 29**, which depends on claim 24 and is the method version of claim 19, it is rejected for the reasons above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-4, 6-11, 13-14, 17, 23, 27 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruffner in view of U.S. Patent No. 6,480,265 to Maimon et al. (hereafter referred to as Maimon). Ruffner describes a multifunctional mobile appliance as detailed above. Maimon is concerned with accurately measuring the distance from a robot to a target. Claims 8-11 and 12-14 are the method version of claims 1-4 and 6-7 and are rejectable for the same reasons as the system claims.

Regarding **claims 1 and 8**, "A robot" reads on a multifunctional mobile appliance capable of performing a variety of tasks out of sight of an owner as illustrated in Ruffner Figs 1 and 8. "a motion unit" reads on a mobile unit (1) Col. 4, line 67 and as shown in Fig.1. "an infrared sensor including an infrared light source to produce pulses of infrared light" partially reads on the first obstacle avoidance mechanism described in Col. 12, lines 2-27. At line 18, Ruffner discusses bouncing ultrasonic pulses off of objects, but in

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lines 15-18 it indicates that the ultrasonic transducers can be replaced by radar or lidar (light detecting and ranging) means. Further, Ruffner, at Col. 17, lines 22-24, discusses substituting passive imaging devices such as IR charge-coupled devices (CCDs) for the active proximity detectors 36, 37 implemented with the sonar implementation. It would have been obvious to one of ordinary skill in the art at the time of the invention to use infrared pulses as suggested in Ruffner (Col. 3, lines 60 – 61) to detect obstacles.

Further, even if Ruffner did not fully detail using light pulses to detect objects, Maimon uses light pulses to detect obstacles, Col 2, lines 31-33 and details using CCD devices to capture reflections and optics to focus the reflections. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Maimon with Ruffner in order to use the less expensive CCD devices to detect reflections. "optics to focus reflections from the infrared light pulses from different portions of the environment of the robot to different detectors in a 2D array of detectors" reads on Maimon's implementation using light pulses. Fig. 8 is a simplified diagram showing a transmitter (40), emitting a pulse (22), which strikes an object (42) from which the pulse is reflected and the reflection strikes a lens (44) where it is focused onto a detector (46). The detector is preferably a plurality of individual detectors. In Fig. 10, Maimon shows an alternate embodiment described in Col. 6, lines 35-56 that uses a 2D array (60) of sensors (62) replacing the single detector previously used. "the detectors producing indications of distances to the closest object in an associated portion of the environment" reads on the first obstacle avoidance mechanism described in Ruffner Col. 12, lines 2-27. The mechanism detects obstacles and their location. At line 18,

Ruffner discusses bouncing pulses off of objects – which indicates there would be multiple readings from an object. “a processor to receive the indications from the infrared sensor, determine a feature in the environment and control the motion unit to avoid the feature.” Reads on the controller/processor (66) as illustrated in Ruffner Fig 8, which receives data from the obstacle detection (70). At Col. 12, line 8, and Col. 36, lines 35-41, Ruffner describes mapping the amplitude and delay of the reflections to obtain a snap shot of objects in the environment.

Regarding **claims 2 and 9**, which depend on claims 1 and 8 respectively, “wherein the indication is produced by measuring a period of time to receive a reflected pulse.” reads on Ruffner Col 12, line 8 – mapping the delay of any reflections.

Regarding **claims 3 and 10**, which depend on claims 1 and 8 respectively, “the indication is produced by measuring an energy of a reflected pulse up to a cutoff time” does not read on Ruffner, which uses the time to the reflected pulse to produce the indications. However, Maimon teaches determining the distance to a target by measuring the energy received in a reflected pulse during a gated interval, Col 4, lines 64-67. (Energy is defined at Col. 1, lines 53-55, as the integral of the brightness or amplitude of the beam, which is a measurement that is easily obtained from a detector such as a charge coupled device (CCD)) It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate Maimon’s distance measurement technique with Ruffner’s automatic appliance because, while sonic waves move slowly enough to time the reflections, light waves travel faster and the time to an infrared reflection would be more expensive to measure than the sonic reflection.

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Maimon can adjust the gated interval to allow the energy measurement technique to accommodate the environment and thereby use the less expensive CCDs to measure the light reflections.

Regarding **claims 4 and 11**, which depend on claims 1 and 8 respectively, "wherein the feature is indicated in an internal map," reads on Ruffner Col. 36, lines 35-41 where obstacles are mapped in the routing grid.

Regarding **claims 6 and 13**, which depend on claims 1 and 8 respectively, "wherein the feature is an object in a room" reads on Ruffner where the obstacle detection as described in Col. 12, lines 2-27 works in the context of performing tasks, such as floor vacuuming, waxing, and polishing, or rug shampooing a room (Abstract).

Regarding **claims 7 and 14**, which depend on claims 1 and 8, "wherein the robot is a robot cleaner" reads on Ruffner's machine performing cleaning tasks as detailed in the abstract.

Regarding **claims 17 and 27**, which are related as system and method of employing the system and depend respectively on claims 15 and 24, "wherein the indications are produced by measuring an energy of a reflected pulse up to a cutoff time" does not read on Ruffner, which uses the time to the reflected pulse to produce the indications. However, Maimon teaches determining the distance to a target by measuring the energy received in a reflected pulse during a gated interval, Col 4, lines 64-67. (Energy is defined at Col. 1, lines 53-55, as the integral of the brightness or amplitude of the beam that is a measurement that is easily obtained from a detector such as a charge coupled device (CCD)) It would have been obvious to one of ordinary

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skill in the art at the time of the invention to incorporate Maimon's distance measurement technique with Ruffner's automatic appliance because, while sonic waves move slowly enough to time the reflections, light waves travel faster and the time to an infrared reflection would be more expensive to measure than the sonic reflection. Maimon can adjust the gated interval to allow the energy measurement technique to accommodate the environment and thereby use the less expensive CCDs to measure the light reflections.

Regarding claims **23 and 33**, which are related as system and method of employing the system and depend respectively on claims 22 and 32, "wherein the infrared sensor includes an infrared light source to produce pulses of infrared light" partially reads on the first obstacle avoidance mechanism described in Col. 12, lines 2-27. At line 18, Ruffner discusses bouncing ultrasonic pulses off of objects, but in lines 15-18 it indicates that the ultrasonic transducers can be replaced by radar or lidar (light detecting and ranging) means. Further, Ruffner, at Col. 17, lines 22-24, discusses substituting passive imaging devices such as IR charge-coupled devices (CCDs) for the active proximity detectors 36, 37 implemented with the sonar implementation. It would have been obvious to one of ordinary skill in the art at the time of the invention to use infrared pulses as suggested in Ruffner (Col. 3, lines 60 – 61) to detect obstacles. Further, even if Ruffner did not fully detail using light pulses to detect objects, Maimon uses light pulses to detect obstacles, Col 2, lines 31-33 and details using CCD devices to capture reflections and optics to focus the reflections. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Maimon with

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Ruffner in order to use the less expensive CCD devices to detect reflections. "optics to focus reflections from the infrared light pulses from different portions of the environment of the robot to different detectors in a 2D array of detectors" reads on Maimon's implementation of energy measurement using light pulses. Fig. 8 is a simplified diagram showing a transmitter (40), emitting a pulse (22), which strikes an object (42) from which the pulse is reflected and the reflection strikes a lens (44) where it is focused on a detector (46). The detector is preferably a plurality of individual detectors. In Fig. 10, Maimon shows a third embodiment described in Col. 6, lines 35-56 that uses a 2D array (60) of sensors (62) replacing the single detector previously used. "the detectors producing indications of distances to the closest object in an associated portion of the environment." Reads on Maimon Col. 6, lines 44-46 where it produces an array of distances to an object.

Claims 5 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruffner and Maimon as detailed above and further in view of Jones.

Regarding claims 5 and 12, which are related as system and method of employing the system and depend respectively from claims 1 and 8, "wherein the feature is a step" does not read on Ruffner and Maimon when "step" is interpreted as a down step, a void, based on the use in the specification where step refers to an edge as in edge of a stair. Ruffner and Maimon identify an up step, but not a down step. Jones identifies a down step as illustrated in Fig. 17 and Col. 7, lines 53-61. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine

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Jones with Ruffner and Maimon because Jones uses optical reflection to identify a step, and Ruffner already identifies an edge, such as an edge of a lawn.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following further prior art references are identified because they each disclose an aspect of the solution as detailed. Burgin, U.S. Patent No. 6,023,064 discloses an object sensing system that uses an array of detectors to detect an object for a robot manipulator; Bauer, U.S. Patent No. 5,677,836 uses a cellularly structured map about a self-propelled robot; Lavarec et al., Patent Pub 2004/0088079 uses multiple emitters and detectors but arranges them circularly around a robot; Sano et al., U.S. Patent No. 6,657,705 receives reflections on an array of detectors, but scans an area explicitly; Juds et al. U.S. Patent No. 5,675,326, uses an array of sensors to detect the presence of a vehicle adjacent to a vehicle, but does not detect an edge or step; and Jones, U.S. Patent No. 7,155,308 detects all the obstacles mentioned, but does not use a 2D array of detectors.

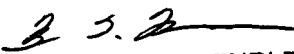
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lin B. Olsen whose telephone number is 571-272-9754. The examiner can normally be reached on M-F, 7:30am-5:00pm EST, Alternate Fri. off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian T. Pendleton can be reached on 571-272-7527. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LO


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SUPERVISORY PATENT EXAMINER